

Jiamin Wan

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Biography Jiamin Wan obtained her B.A. in Chemistry, M.S. in Geochemistry, and Ph.D. in Hydrology (1993). Her research focuses on coupled geochemical reactions and transport in complex, multi-phase subsurface systems, particularly those involving interfacial phenomena. Her research accomplishments include: (a) revealing preferential sorption of colloids onto fluid-fluid interfaces, and its impact on colloid fate and transport in subsurface (Wan and Wilson 1994a&b; Wan et al. 1994); (b) developing and testing the film straining model for colloid transport in unsaturated porous media (Wan and Tokunaga 1997, 1998); (c) revealing pH zonation and reaction fronts in waste plumes and the strongly impact on contaminant fate and transport in the Hanford vadose zone plumes (Wan et al. 2004a,b,c); (d) identifying mechanisms responsible for uranium migration through the deep Hanford vadose zone to the groundwater (Wan et al. 2008, 2009); and (e) discovering that bioreduced U(IV) can be re-oxidized under sustained reducing conditions (Wan et al. 2005, 2008; Tokunaga et al. 2008a,b; this finding helped the research community and remediation industry realizing that bioreduction-based U remediation is unsustainable).

Education

Ph.D., Hydrology, 1993, New Mexico Institute of Mining and Technology, NM, USA.
M.S., Geochemistry, 1984, Institute of Geochemistry, Chinese Academy of Sciences, China.
B.S., Chemistry, 1981, Beijing University of Iron and Steel Technology, China.

Research Interests

- Colloid and surface chemistry: Fate and transport of natural occurred and engineered colloids and nanoparticulates in subsurface environment.
- Contaminant geochemistry: Biogeochemical reactions and transport of radionuclides and contaminant metals in subsurface.
- High pressure-temperature multi-fluid system: Geochemical processes and mechanisms of CO₂ trapping in deep reservoirs.

Professional Positions

1997- present: Staff scientist, Earth Science Division, LBNL.
1995 -1997: Scientist, Earth Science Division, LBNL.
1993 -1995: Post-doctoral research fellow, Earth Science Division, LBNL.
1984 -1986: Scientist, Institute of Geochemistry, Chinese Academy of Sciences, China.

Funding Awards through Peer reviewed proposals, as the PI

- Colloid transport in unsaturated porous media: 1995-1997, DOE – BES.
- Sorption of organics and metals onto gas-water interfaces: 1997-1999, DOE – EMSP.
- Unsaturated flow and colloid transport: 1998-2000, DOE – BES.
- Mesoscale biotransformation dynamics of Cr and U: 1999-2001, DOE – NABIR.
- Colloids and fluid-fluid interfaces: 2001-2003, DOE – BES.
- Evolution of alkaline-saline waste plumes in the Hanford site: 2001-2003, DOE – EMSP.
- Coupled transport and bioreduction of U(VI) in sediments: 2002-2004, DOE – NABIR.
- Nanoparticles in the subsurface: 2004-2006, DOE – BES.
- Reactive transport of U in waste plumes in Hanford Site: 2004-2006, DOE – EMSP.
- Hydrological and geochemical studies on Hanford Site U plumes: 2007-2009, DOE–ERSP.
- Environmental impacts of engineered nano-particulates: 2008-2010, DOE – BER.

Publications (refereed journals)

Wan, J., Y. Kim, T.K. Tokunaga, Z. Wang, S. Dixit, C.I. Steefel, E. Saiz, M. Kunz, and N. Tamura. Spatially resolved U(VI) partitioning and speciation: Implications for plume scale behavior of contaminant U in the Hanford vadose zone. Environ. Sci. Technol. 43, 2247-2253, 2009.

Tokunaga, T.K., Y. Kim, and **J. Wan**. Potential remediation approach for uranium-contaminated groundwaters through potassium uranyl vanadate precipitation. Environ. Sci. Technol., 43, 5467-5471, 2009.

Wan, J., T.K. Tokunaga, Y. Kim, E. Brodie, R. Daly, T.C. Hazen, and M.K. Firestone. Effects of organic carbon supply rates on uranium mobility in a previously bioreduced contaminated sediment. Environ. Sci. Technol. 42, 7573-7579, 2008.

Tokunaga, T.K., **Wan, J.**, Kim, Y., R.A. Daly, E.L. Brodie, T.C. Hazen, D. Herman, and M.K. Firestone. Influences of organic carbon supply rate on uranium reduction in initially oxidizing, contaminated sediment. Environ. Sci. Technol. 42, 8901-8907, 2008.

Wan, J., T.K. Tokunaga, Y. Kim, Z. Wang, A. Lanzirotti, E. Saiz, and R.J. Serne, Effect of saline waste solution infiltration rates on uranium retention and spatial distribution in Hanford sediments, Environ. Sci. Technol., 42, 1973-1978, 2008.

Tokunaga, T.K., **J. Wan**, Y. Kim, S.R. Sutton, M. Newville, A. Lanzirotti, and W. Rao. Real-time X-ray absorption spectroscopy of uranium, iron, and manganese in contaminated sediments during bioreduction. Environ. Sci. Technol., 42, 2839-2844, 2008.

Zheng, Z., G. Zhang, **J. Wan**, Reactive transport modeling of column experiments on the evolution of saline-alkaline waste solutions, Journal of Contaminant Hydrology, 97, 42-54,

2008.

- He, Y.T., **J. Wan**, and T.K. Tokunaga, Kinetic stability of hematite nanoparticles: the effect of particle sizes, *J. Nanopart. Res.*, 10:321-332, 2008.
- Wan, J.**, T. Tyliszczak, and T.K. Tokunaga, Organic carbon distribution, speciation, and elemental correlations within soil microaggregates: Applications of STXM microscopy and NEXAFS spectroscopy, *Geochim. Cosmochim. Acta*, 71, 5439-5449, 2007.
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- Zheng, Z., **J. Wan**, X. Song, and T.K. Tokunaga. Sodium meta-autunite colloids: Synthesis, characterization, and stability. *Colloids Surfaces A. Phys. Eng. Aspects*, 274, 48-55, 2006.
- Brodie, E.L., T.Z. DeSantis, D.C. Joyner, S. Baek, J.T. Larsen, G.L. Andersen, T.C. Hazen, D.J. Herman, T.K. Tokunaga, **J. Wan**, and M.K. Firestone, Application of a high-density oligonucleotide microarray approach to study bacterial population dynamics during uranium reduction and reoxidation. *Appl. Environ. Microbiol.* 72:6288-6298, 2006.
- Wan, J.**, T.K. Tokunaga, E. Brodie, Z. Wang, Z. Zheng, T.C. Hazen, M.K. Firestone, S.R. Sutton, Reoxidation of bioreduced U under reducing conditions. *Environ. Sci. Technol.*, 39, 6162-6169, 2005.
- Tokunaga, T. K., **J. Wan**, J. Pena, E. Brodie, M.K. Firestone, and T.C. Hazen, Uranium reduction in sediments under diffusion-limited transport of organic carbon, *Environ. Sci. Technol.*, 39, 7077-83, 2005.
- Zheng, Z. and **J. Wan**, Release of contaminant U(VI) from soils, *Radiochim. Acta*, 93, 1-7, 2005.
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- Zhang, G., Z. Zheng, **J. Wan**, Modeling reactive geochemical transport of concentrated aqueous solutions in variably saturated media. *Water Resour. Res.*, 41, W02018, doi: 10.1029/2004WR003097, 2005.
- Tokunaga, T.K., **J. Wan**, J. Pena, S.R. Sutton, and M. Newville. Hexavalent uranium diffusion in soils from concentrated acidic and alkaline solutions. *Environ. Sci. Technol.* 38, 3056-3062, 2004.
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